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(71) Applicant(s)

Greco's Biscuits Limited

(Incorporated in the United Kingdom)

Cross Chancellor Street, Meanwood, LEEDS,  
LS26 2SN, United Kingdom

(72) Inventor(s)

Daniel Gartland  
Andrew Wilby  
Helen Watson

(74) Agent and/or Address for Service

Appleyard Lees  
15 Clare Road, HALIFAX, West Yorkshire, HX1 2HY,  
United Kingdom

(56) Documents Cited

GB 2019187 A GB 1517912 A EP 0220836 A2  
US 4574987 A US 4421778 A US 4374154 A  
US 4346120 A US 4333954 A US 4146652 A

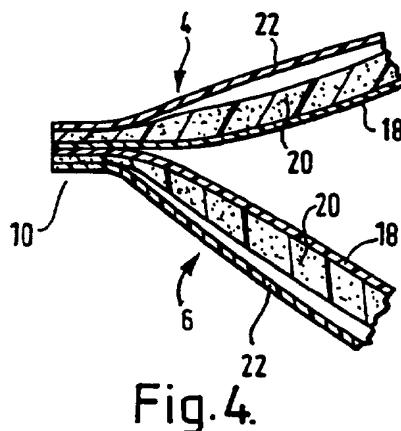
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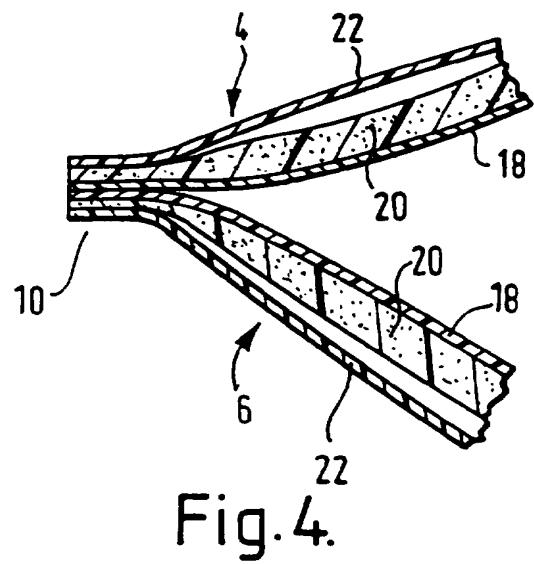
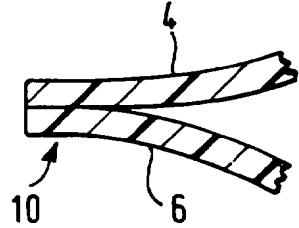
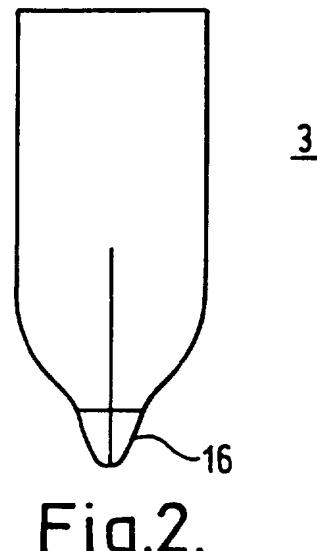
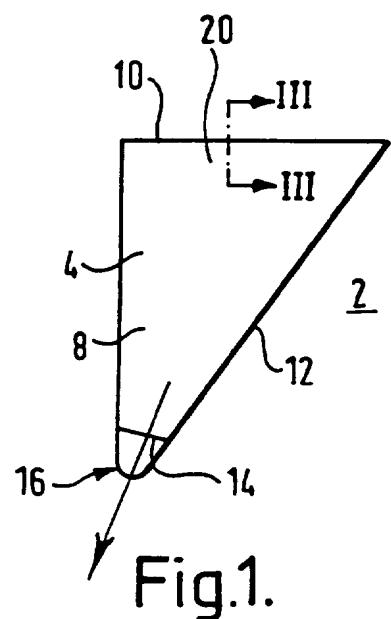
## (54) Packaged soft serve ice cream

(57) A packaged food product comprises a receptacle having superimposed walls 4, 6 in which is arranged soft-serve ice-cream. Walls 4, 6, include an inner plastics layer 18, a foam layer 20 and an outer plastics layer 22. Between the foam layer 20 and outer layer 22 there is defined an air gap. The ice-cream formulation comprises in a preferred embodiment fat in the form of hydrogenated kernel oil (6 wt%), sucrose (5 wt%), glycerol (7 wt%) and a emulsifier/stabiliser (0.6 wt%).

The product is suitable for dispensing at a temperature of less than -10°C immediately after removal from a domestic freezer.



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PACKAGED FOOD PRODUCT

This invention relates to a packaged food product and particularly, although not exclusively, relates to 5 packaged ice-cream. The invention also provides ice-cream for extrusion from a flexible receptacle per se and a receptacle for a foodstuff per se.

"Soft-serve" ice-cream of a type sold under the Trade 10 Mark MR WHIPPY has been well-known for about fifty years. The ice-cream may start to freeze at a temperature of about -2°C. At this temperature, the ice-cream is relatively fluid. It is dispensed at a temperature of about -5°C to -6°C using a dispensing machine which 15 incorporates a refrigerated receptacle in which the ice-cream is contained and a pump means arranged to pump ice-cream out of the receptacle via a dispensing nozzle. At the temperature of dispensing, the ice-cream is sufficiently fluid for it to be formed into a spiral 20 arrangement on an ice-cream cone. An elongate cylinder of flaky chocolate, for example one sold under the Trade Mark FLAKE, can then readily be penetrated into the ice-cream. Soft-serve ice-cream is popular, partly in view of its 25 relatively soft texture, but it is only sold in commercial outlets which have the appropriate dispensing machine.

Most ice-cream that is served in households is kept in a deep freeze at a temperature in the range -16°C to -18°C prior to serving. The ice-cream is relatively hard 30 at this temperature. For example, to insert a probe at a rate of 1mm/sec into the ice-cream at -16°C to -18°C requires a pressure of about 4.5 KPa.

It is known to provide soft frozen dessert products 35 which can be readily extruded upon removal from a home

freezer, for example as described in US 4,374,154. However, the applicant is not aware of any such product having been commercialised in the United Kingdom.

5        The apparent lack of commercialisation may be due to the failure of prior products to satisfactorily address the competing requirements that must be overcome to produce a commercially viable product. For example, the foodstuff, such as ice-cream, to be extruded from a  
10      receptacle must have appropriate fluidity for extrusion by hand immediately after removed from a home freezer; the receptacle must be sufficiently flexible and robust for it to manipulated a multiplicity of times to enable the foodstuff to be extruded; a minimum amount of cold should  
15      be transmitted to the user's hands during contact with the product and preferably the product should feel relatively warm to the user; a minimum amount of heat should be transmitted, from the user's hands or the surroundings, to the foodstuff in the receptacle so as to minimize the rate  
20      of warming of the foodstuff on removal from the home freezer; it must be possible for the product to remain in a satisfactory state for an extended period of time, for example an hour, during its passage from its point of sale to the home freezer; and the product must be  
25      manufacturable at a commercially viable cost.

It is an object of the present invention to provide a packaged food product which may be improved, at least in some respects, compared to known products.

30      According to the invention, there is provided a packaged food product comprising:

a flexible receptacle having a wall which includes first and second layers of flexible material, with an air gap being defined between said layers; and

5 a foodstuff within the receptacle, wherein the foodstuff is adapted to be sufficiently fluid at a temperature of less than (i.e. cooler than) -10°C such that it can be dispensed from an opening in said receptacle by manual application of a force.

10

Said foodstuff is preferably ice-cream.

Said foodstuff is preferably arranged to be dispensed by a user causing the receptacle to be compressed. 15 Compression of the receptacle may be aided using a mechanical device. For example, an end of the receptacle remote from the opening may be secured or securable to an axle arranged to be rotated by a user for causing the receptacle to wrap therearound in order to reduce the free 20 volume of receptacle. Preferably, the foodstuff is arranged to be dispensed without using such a device.

Said first and second layers of flexible material of said receptacle preferably comprise plastics material, 25 suitably in sheet form. The thickness of said first and/or said second layers may be in the range 1  $\mu\text{m}$  to 1 mm, preferably in the range 5  $\mu\text{m}$  to 500  $\mu\text{m}$ , more preferably in the range 5  $\mu\text{m}$  to 100  $\mu\text{m}$ . Said first layer of material preferably contacts the foodstuff in the 30 receptacle and is, suitably, a food grade polymeric material, for example polythene. Said second layer preferably is an outermost layer of the receptacle. It preferably incorporates heat reflecting means, for example by including a metallized surface, for reflecting heat

outside the receptacle away from the foodstuff within the receptacle.

Said air gap between said first and second layers  
5 preferably includes entrapped air therewithin. The air  
gap may be defined by a foam material arranged between the  
first and second layers, with air being entrapped within  
the structure of the foam material. Preferably, however,  
the air gap comprises an open area.

10 Said wall may incorporate a foam material between  
said first and second layers. Preferably, the foam  
material contacts said first layer. It is, however,  
preferably spaced from said second layer, suitably by said  
15 air gap.

Said receptacle may comprise first and second walls,  
each of which may independently have the structure of said  
wall as described above. The walls may be sealed to one  
20 another, for example by heat sealing (or the like) along  
their free edges to define the receptacle. To this end,  
said first layers of said respective walls are preferably  
in contact and are made of a material or materials which  
allow said layers to be heat sealed to one another.  
25 Preferably, both of said first layers are made of the same  
material. Preferably, each layer of said walls is heat  
sealable to a respective adjacent layer. Preferably, in  
sealed regions of said wall or walls, a reduced, or no,  
air gap is defined between said first and second layers.

30 Said receptacle is preferably non-self-supporting.  
Said receptacle preferably has a substantially undefined  
three-dimensional shape. Preferably, said foodstuff  
substantially defines the three dimensional shape. Said  
35 receptacle preferably tapers inwardly towards a region in

which said receptacle is arranged to define said opening. Said receptacle may include a preformed opening, for example a hole in a wall of the receptacle. Prior to dispense, for example prior to initial opening of the 5 receptacle, the opening may be closed by a removable closure means. Said closure means may be arranged to indicate whether the receptacle has been previously opened.

10 After opening, the opening may be arranged to be closed by a closure means.

The opening may be arranged to have any desired cross-section, for example circular or star-shaped. The 15 opening may have a maximum diameter of at least 1 cm, preferably at least 1.5 cm and, more preferably at least 2 cm. The area of the opening may be at least 2 cm<sup>2</sup>, preferably at least 3 cm<sup>2</sup> and, more preferably, at least 4 cm<sup>2</sup>.

20 The receptacle may have a volume of at least 0.5 litres, preferably of at least 1 litre. The volume is preferably less than 5 litres and, more preferably less than 3 litres.

25 The foodstuff may be adapted to be sufficiently fluid at -12°C, preferably at -15°C, more preferably at -18°C, such that it can be dispensed from a said opening in said receptacle by manual application of a force.

30 Said foodstuff may be such that, at a temperature in the range -16°C to -18°C, a probe can be inserted thereinto at a rate of 1mm/sec using a pressure of less than 1000 Pa. Preferably, the pressure used may be less than

800 Pa. More preferably, the pressure used may be less than 600 Pa.

Said foodstuff is suitably arranged to be extruded  
5 from a said opening.

The foodstuff may start to freeze at a temperature of less than -5°C, preferably less than -8°C, more preferably less than -11°C.

10 Where the foodstuff is ice-cream, said ice-cream may include 2 - 20 wt% fat, 2 - 10 wt% sucrose or other sweetening agent, 5 - 20 wt% milk solids, 10 to 80 wt% water and 1 - 15 wt% of a freezing point depression compound. Said freezing point depression compound may comprise further sucrose or another sugar, or may comprise another edible compound adapted to lower the freezing point. Preferred freezing point depression compounds include polyols, for example glycerol. The ice-cream may 15 include more than 2 wt%, preferably more than 4 wt%, more preferably more than 5 wt%, of a polyol, for example glycerol. Especially preferred is the case wherein the ice-cream includes more than 6 wt% of a polyol, for 20 example glycerol.

25 The receptacle and the product are advantageously arranged so that the product can be subjected to ambient temperature for a reasonable time, with minimum detriment to the foodstuff. With prior art products, there is a risk 30 that the foodstuff may melt after a short time, for example 15 minutes at ambient temperature (e.g. 25°C). When such a melted foodstuff is re-frozen, its quality is impaired due to the growth of large ice crystals. Suitably, the product of the present invention can be 35 subjected to ambient temperature for a period of at least

30 minutes, preferably 45 minutes, more preferably 60 minutes, without any significant amount of large crystal growth or other detrimental effects when the product is replaced in a freezer.

5

The invention extends to a foodstuff per se, the foodstuff being adapted to be sufficiently fluid at a temperature of -10°C such that it can be dispensed from an opening by manual application of a force.

10

The foodstuff may be as described in any statement herein.

15 The invention extends to a receptacle for a foodstuff per se.

20 The invention extends to a method of packaging a foodstuff which is adapted to be sufficiently fluid at a temperature of -10°C such that it can be dispensed from an opening in a receptacle by manual application of a force, the method comprising providing said foodstuff in a receptacle arranged to define an opening for the dispense of the foodstuff.

25 The invention extends to a method of dispensing a foodstuff at a temperature of less than -10°C, the method comprising causing the foodstuff in a fluidic state to pass out of an opening in a receptacle in which the foodstuff is contained by the manual application of a force by an operator.

30 The force may be applied by the operator directly contacting the receptacle, for example in order to cause the receptacle to be compressed to apply said force.

35

Any feature of any aspect of any invention described herein may be combined with any feature of any other aspect of any invention described herein.

5        Specific embodiments of the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

10        Figure 1 is a front view of a dispensing bag;

Figure 2 is a front view of another dispensing bag;

15        Figure 3 is a cross-section along line III-III of figure 1;

15        Figure 4 is a detailed cross-section of the walls of the arrangement shown in figure 3 (not to scale).

20        In the figures, the same or similar parts are annotated with the same reference numerals.

An ice-cream is made up according to the following formulation:

		wt%
25	Fat (hydrogenated kernel oil)	6
	Sucrose	5
	Glycerol	7
	Emulsifier/Stabiliser	0.6
	Skimmed Milk Powder	12.1
30		wt%
	Flavour	as required
	Colour	as required
	Water	to 100%

The ice-cream is found to start to freeze at a temperature of about  $-14^{\circ}\text{C}$ . Consequently, even after a period in a domestic refrigerator at about  $-18^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , the ice-cream is still relatively soft and flowable. (It should be noted that conventional "soft-serve" ice-cream of the type described herein would be relatively solid and non-flowable at  $-18^{\circ}\text{C}$ ).

Tests on the fluidity of the ice-cream have shown that, at a temperature in the range  $-16^{\circ}\text{C} - 18^{\circ}\text{C}$ , a probe can be inserted into the ice-cream at a rate of 1mm/sec using a pressure of about 400 Pa.

The lowering of the freezing point of the ice-cream is achieved by increasing the amount of glycerol in the formulation to 7 wt% as shown above. This compares with the 0 - 2 wt% found in conventional soft-serve ice-cream. It may be possible to use other ingredients to lower the freezing point to the desired level.

The ice cream is provided in a bag 2 or 3 shown in figures 1 to 4.

Referring to figures 1 to 3, bag 2 comprises first and second superimposed walls 4, 6 made out of sheets of material. The walls are heat sealed together along edges 8, 10, 12 to define a receptacle for the ice-cream. A hole 14 of about 2.5 cm maximum diameter is cut between walls 8, 12 and is arranged to cooperate with a nozzle arrangement 16 which can be fixed to walls 4, 6. The nozzle arrangement may have any desired cross-section, for example it may be circular or star-shaped. A cap (not shown) is provided for closing the nozzle.

Referring to figure 4, walls 4, 6 are of laminate construction and include: an inner layer 18 having a thickness of about 50  $\mu\text{m}$  and being made out of a metallized flexible food grade polymeric sheet material,  
5 for example low density polythene; a middle layer 20 having a thickness of 2-3 mm and being made of a high density flexible foam material; and an outer layer 22 having a thickness of about 50  $\mu\text{m}$  and being made out of a metallized flexible food grade polymeric sheet material,  
10 for example low density polythene.

As shown in the figure, the foam layer 20 is compressed in the region 10 of the heat seal so that adjacent layers of the walls make intimate face-to-face  
15 contact. However, inwards of the heat seal towards the container portion of the bag, the foam layer 20 is expanded and is not in contact with outer layer 22. In fact, an air gap is defined between the two layers during manufacture. The air gap provides a heat insulating layer  
20 in conjunction with the foam layer 20. The inner layer 18 may simply abut the foam layer 20 or be heat sealed or otherwise bonded thereto.

The bag 2 may be machine filled with ice-cream at its  
25 point of manufacture either via opening 14, prior to securement of nozzle 16 in position or via an opening between walls 4, 6 along edge 10, prior to the walls 4, 6 being heat sealed together along this edge.

30 The bag including the ice-cream may be stored in a domestic refrigerator at about -18°C.

When it is desired to dispense ice-cream, the cap  
35 (not shown) is removed from the nozzle and the ice-cream is then caused to be extruded via the nozzle. This can be

achieved manually (because the ice-cream is sufficiently soft) by a user squeezing the bag, suitably from its upper end 20. It should be noted that no mechanical means of causing ice-cream to be extruded is required. The force 5 to extrude the ice-cream can readily be provided by a person. Extruded ice-cream has the cross-section of the opening, for example it may be circular or star-shaped. It may be directed from the bag onto an ice-cream cone in the same way as in the known ice-cream dispensing machine 10 described above.

After ice-cream has been dispensed, the nozzle may be released by the cap.

15 The bag may have any convenient volume. It may be arranged to contain at least one litre of ice-cream. Two litre bags may also be provided.

20 Bag 3 is the same in construction as bag 2 but its shape is different. Bag 3 is generally cylindrical but tapers inwardly towards nozzle arrangement 16. It may be manufactured and used as described above for bag 2.

25 It should now be appreciated that the provision of a bag 2 including ice-cream formulated as described may advantageously allow soft-serve ice-cream to be provided and dispensed immediately after it has been removed from a refrigerator at about -18°C. It is found that, advantageously, the bag can easily be manipulated to 30 dispense the ice-cream; it feels relatively warm to a user; and melting of the ice-cream whilst out of the refrigerator and/or during dispense is sufficiently low.

35 The reader's attention is directed to all papers and documents which are filed concurrently with or previous to

this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

5

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, 10 except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

20

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A packaged food product comprising:

5 a flexible receptacle having a wall which includes first and second layers of flexible material, with an air gap being defined between said layers; and

10 a foodstuff within the receptacle, wherein the foodstuff is adapted to be sufficiently fluid at a temperature of less than 10°C such that it can be dispensed from an opening in said receptacle by manual application of a force.

15 2. A product according to Claim 1, wherein said foodstuff is ice-cream.

3. A product according to Claim 1 or Claim 2, wherein said foodstuff is arranged to be dispensed by a user 20 causing the receptacle to be compressed.

4. A product according to any preceding claim, wherein said first and second layers comprise plastics material in sheet form.

25 5. A product according to any preceding claim, wherein said first layer contacts the foodstuff in the receptacle and is a food grade polymeric material.

30 6. A product according to any preceding claim, wherein said second layer is an outermost layer of the receptacle.

7. A product according to Claim 6, wherein said outer layer includes heat reflecting means for reflecting heat

outside the receptacle away from the foodstuff within the receptacle.

5 8. A product according to any preceding claim, wherein  
said air gap between said first and second layers includes  
entrapped air therewithin.

10 9. A product according to any preceding claim, wherein  
said wall incorporates a foam material between said first  
and second layers.

10. A product according to Claim 9, wherein the foam  
material contacts said first layer.

15 11. A product according to Claim 9 or Claim 10, wherein  
said foam material is spaced from said second layer by  
means of said air gap.

20 12. A product according to any preceding claim, wherein  
said receptacle comprises first and second walls having  
any characteristic of said wall as described in any  
preceding claim.

25 13. A product according to Claim 12, wherein said walls  
are heat sealed to one another.

30 14. A product according to Claim 13, wherein in said  
sealed regions of said wall or walls, a reduced or no air  
gap is defined between said first and second layers of  
respective walls.

15. A product according to any preceding claim, wherein  
said receptacle is non-self-supporting.

16. A product according to any preceding claim, wherein said foodstuff is such that, at a temperature in the range -16°C to -18°C, a probe can be inserted thereinto at a rate of 1 mm per second using a pressure of less than 1,000 Pa.

5

17. A product according to any preceding claim, wherein said foodstuff starts to freeze at a temperature of less than -5°C.

10 18. A product according to any of Claims 3 to 17 when dependent upon Claim 2, wherein said foodstuff includes 2 to 20 wt% fat, 2 to 10 wt% sucrose or other sweetening agent, 5 to 20 wt% milk solids, 10 to 80 wt% water and 1 to 15 wt% of a freezing point depression compound.

15

19. A product according to Claim 18, wherein said freezing point depression compound comprises further sucrose or another sugar, or may comprise another edible compound adapted to lower the freezing point.

20

20. A product according to Claim 18 or Claim 19, wherein said freezing point depression compound is a polyol.

25 21. A product according to Claim 20, wherein said polyol is glycerol.

22. A product according to Claim 20 or Claim 21 which includes more than 4 wt% of said polyol.

30 23. A foodstuff adapted to be sufficiently fluid at a temperature of -10°C such that it can be dispensed from an opening by manual application of a force per se.

35 24. A receptacle for a foodstuff as described herein per se.

25. A method of packaging a foodstuff which is adapted to be sufficiently fluid at a temperature of -10°C such that it can be dispensed from an opening in a receptacle by manual application of a force, the method comprising 5 providing said foodstuff in a receptacle arranged to define an opening for the dispense of the foodstuff.

26. A method of dispensing a foodstuff at a temperature of less than -10°C, the method comprising causing the 10 foodstuff in a fluidic state to pass out of an opening in a receptacle in which the foodstuff is contained by the manual application of a force.

27. A product substantially as hereinbefore described 15 with reference to the accompanying diagrammatic drawings.

28. A foodstuff substantially as hereinbefore described with reference to the accompanying diagrammatic drawings.

20 29. A receptacle substantially as hereinbefore described with reference to the accompanying diagrammatic drawings.



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**Application No:** GB 9617865.2  
**Claims searched:** 1-23,25-28

**Examiner:** Keith Kennett  
**Date of search:** 7 November 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A2B ( BMF2, BMF9, BMF12, BMF19 ); B8C ( CWA1 )

Int Cl (Ed.6): A23G 9/02, B65D 85/78

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2019187 A ( UNILEVER ) see page 1 lines 48-52 & Examples	23
X	GB 1517912 ( UNILEVER ) see page 2 lines 45-62, Example 1 & page 4 lines 1-14	23
X	EP 0220836 A2 ( GENERAL FOODS ) see page 2 line 32 to page 3 line 5	1,23
X	US 4574987 ( HALLIGAN ) see whole document	1-3,5,6,8, 12-14,17, 23,25,26
X	US 4421778 ( KAHN ) see column 1 lines 52-61	23
X	US 4374154 ( COLE ) see column 1 lines 46-51 & column 3 lines 32-37	1,23,25,26
X	US 4346120 ( MORLEY ) see column 1 lines 57-59 & column 3 lines 52-65	1,23,25,26
X	US 4333954 ( TRZECIESKI ) see column 1 lines 27-32 & Example 1	23
X	US 4146652 ( KAHN ) see Example 20	1,23,25,26

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.